REMARKS

Claims 1-23 are pending. All stand rejected. The applicants have amended the specification as described below. No new matter has been entered. The applicants respectfully request further consideration and re-examination in view of the amendments above and remarks below.

Comments on the Specification:

The office action requests updating of the status and serial numbers of the related applications listed on page one of the specification. The applicants have amended the specification to provide the serial numbers and filing dates.

The office action states that in line 6 of the Abstract, one of the periods should be deleted. The applicants have amended the Abstract as suggested.

The office action states that in the second to last line of page 1 of the specification, words appear to be missing. The applicants have amended the paragraph to delete the affected sentence.

The office action states that the Abstract is unclear, particularly at lines 10-15. The office action indicates that the Summary is also unclear for the same reason. The applicants have amended the Abstract at line 10 so that "the sum" is referred to as "the sum of transport demands." In view of this, the "sum" referenced at lines 10-12 is more clearly related to the "sum" described in the prior sentence at lines 6-8 of the Abstract. The applicants have amended the Summary in the same manner.

The applicants have amended the specification at paragraph [0027] on page 5, line 28, to page 6, line 7, to correct a minor informality in which the word "first" was typed as "fist."

Provisional Obviousness-Type Double-Patenting Rejection:

Claims 1-23 are provisionally rejected as being unpatentable over claims 1-40 of co-pending Application Serial No. 10/627,324. The applicants respectfully submit that because the rejection is provisional, it need not be overcome unless and until the rejection is made non-provisional. The applicants do not thereby acquiesce to any statements made in the office action regarding obviousness of any claims.

Rejection under 35 U.S.C. § 112:

Claims 1-23 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly not being enabled by the written description. Particularly, the office action states:

> The specification fails to disclose details of the last step of the independent claims. The specification fails to disclose how the local solution is employed to solve an integer program comprising the placement indicator, the communication constraints, and the objective so as to determine the placement of the services onto the nodes. Figures 3 and 4 are no different than the claims. Figure 7 is flow chart for determining whether a new value meets optimality criteria and Figure 8 merely shows the basic components of a computer.

The applicants respectfully traverse the rejection. An integer program is a type of optimization problem in which integer variables are defined, one or more constraints are applied and values for the variables are determined in an effort to maximize one or more objectives. Integer programs are described in the literature. See, for example, "A Comparison of Two Methods for Solving 0-1 Integer Programs Using a General Purpose Simulated Annealing Algorithm" by Abramson, et al. and "Domain-Independent Local Search for Linear Integer Optimization" by Walser, both of which were cited by the applicants in the Information Disclosure Statement submitted on July 25, 2003.

The applicants' invention, as recited in the independent claims, is a novel method of determining a placement of services of a distributed application onto nodes of a distributed resource infrastructure including steps of forming and solving an integer program. Independent claims 6, 11, 17 and 23, expressly recite steps of "forming an integer program..." and "employing a local search solution to solve the integer program...". Claims 1 and 12, recite "employing a local search solution to solve an integer program...". The integer program of claims 1 and 12 is formed by the steps of "forming communication constraints..." and "forming an objective...".

Taking applicants' claim 1 as an example, it recites that a first step of the method comprises "establishing a placement indicator for a specific service." As explained in the applicants' specification, a placement model comprises a placement indicator, the value of which indicates whether or not a specified service of a distributed application is

assigned to a specified node of a distributed resource infrastructure. See applicants' specification at paragraph [0022] on page 4, lines 18-25. Because the variable indicates whether or not a specified service is assigned, these are integer variables.

Claim 1 also recites a step of "forming communication constraints between node pairs which ensure that a sum of transport demands between a particular node pair does not exceed a transport capacity between the particular node pair, each term of the sum comprising a product of a first placement variable, a second placement variable, and the transport demand between the services associated with the first and second placement variables...". As explained in the applicants' specification, the communication constraints ensure that transport demands between node pairs do not exceed transport capacities between node pairs. Applicants' specification at paragraph [0021] on page 4, lines 8-10. The applicants' specification further explains that each of the communication constraints is made up of a sum of terms and that each of the terms comprises a product of a first placement variable, a second placement variable and the transport demand between the services associated with the first and second placement variables. Applicants' specification at paragraph [0021] on page 4, lines 10-14. Transport demands between pairs of services are represented mathematically as a matrix in paragraph [0024] on page 5, lines 2-16, of the applicants' specification. Transport capacity is represented mathematically as a matrix in paragraph [0027] on page 6, lines 2-7, of the applicants' specification.

In addition, claim 1 recites a step of forming an objective. As explained in the applicants' specification, the determination of a placement of the distributed application onto the distributed resource infrastructure is generally accomplished according to an objective such as minimizing network traffic, minimizing latency in order to reduce response time, or balancing a load on the nodes. Applicants' specification at paragraph [0020] on page 4, lines 1-5.

Claim 1 also recites a step of "employing a local search solution to solve an integer program comprising the placement indicator, the communication constraints, and the objective to determine the placement of the services onto the nodes." As explained in the applicants' specification, a local search solution is employed to solve an integer program comprising the placement model (which includes the recited placement

indicator), the communication constraints and the objective, which provides the placement of the service onto the nodes. Applicants' specification at paragraph [0024] on page 4, lines 14-17. An exemplary embodiment of employment of the local search solution is described in detail in connection with Figure 7 of the applicants' specification. See applicants' specification at paragraphs [0048]-[0052] on page 10, line 21, to page 11, line 32.

In summary, employment of the local search solution described in connection with Figure 7 involves randomly initializing the values of the placement indicators (step 704), selecting an unsatisfied constraint in step 706, creating stores in memory for each placement indicator in the unsatisfied constraint (step 708), parsing the unsatisfied constraint by term, changing the value of one indicator while holding the others constant (step 710), choosing a variable to change according to an improvement criterion, such as the placement indicator which most improves the unsatisfied constraint (step 712), and determining whether a solution has been found (step 714). Applicants' specification at paragraph [0050]-[0051] on page 11, lines 8-28. If not, the entire process is repeated (by re-initializing the variables) or just a portion of the process is repeated (by selecting another unsatisfied constraint). Applicants' specification at paragraph [0051] on page 11, lines 27-29.

If a solution is found in step 714, a final assignment of values to the placement indicators is output as the result. Applicants' specification at paragraph [0051] on page 11, lines 29-31. As explained above, the placement indicators indicate whether or not a specified service of a distributed application is assigned to a specified node of a distributed resource infrastructure. Therefore, the values determined for each indicator by the local search solution indicate which services of the distributed application are assigned to which nodes of the distributed resource architecture.

The applicants also draw attention to co-pending U.S. Application No. 20050021583, which also describes a local search solution of an integer program, and which is incorporated by reference.

In view of the above, the applicants respectfully submit that the step of employing a local search solution as recited in the independent claims is thoroughly described in the applicants' specification. Further, the applicants respectfully submit that after having

read the applicants' specification, a person of ordinary skill in the art to which the applicants' invention pertains would be able to duplicate the claimed invention without undue experimentation. Accordingly, the applicants' respectfully request that the rejection under 35 U.S.C. § 112, first paragraph, be removed.

Claims 1-23 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Particularly, the office action states:

> With respect to claim 1, it is not seen how the steps recited in the claim combination are able to determine a placement of services of a distributed application onto nodes of a network as called for in the preamble. The steps merely suggest to use placement indicator, communication constraints, and objective to determine the placement of services. Following the steps does not result in any determination of placing a service onto a node of a network. Other independent claims have similar defects.

The applicants respectfully traverse the rejection. As explained above, the placement indicators indicate whether or not a specified service of a distributed application is assigned to a specified node of a distributed resource infrastructure. And, as is also explained above, the step of employing a local search solution determines values for the placement indicators. Accordingly, the step of employing a local search solution recited in each of the independent claims determines which services of the distributed application are assigned to which nodes of the distributed resource architecture by determining values for the placement indicators. Therefore, the steps recited in the claims do, in fact, determine a placement of services of a distributed application onto nodes of a network as called for in the claim preambles.

In view of the above, the applicants' respectfully request that the rejection under 35 U.S.C. § 112, second paragraph, be removed.

Conclusion:

In view of the above, the Applicants submit that all of the pending claims are now allowable. Allowance at an early date would be greatly appreciated. Should any outstanding issues remain, the Examiner is encouraged to contact the undersigned at

(408) 293-9000 so that any such issues can be expeditiously resolved.

Respectfully Submitted,

Dated: _April 17, 2007_

Derek J. Westberg (Reg. No. 40,872)